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*Monsieur Leewenhoecks Letter to the Publisher, wherein some account is given of the manner of his observing so great a number of little Animals in divers sorts of water, as was deliver'd in the next foregoing Tract: English'd out of Dutch.*

SIR,

I Received your Letters of the 12th and 22th of the last month; and I was not a little pleased, that my Observations about Water had not displeased your learned Philosophers. Nor do I wonder, they could not well apprehend, how I had been able to observe so vast a number of living Creatures in one drop of water, that being very hard to conceive without an ocular inspection. Meantime I never affirmed, that I could determine a certain number of those Animals living in water, but I generally said, that I imagined I saw so many: Not that I doubt of the truth of the thing, but use a certain number for an uncertain, and that not by exceeding the number, but by lessening it. I thus order my division of the Water and the enumeration of the *animalcula*: I suppose, that a drop of Water doth equal a Pea in bigness; and I take a little quantity of water, of a round figure, as big as a Millet-grain; this I reckon to be the one and ninetieth part of a pea: for when the *axis* of a Millet-seed maketh 1, that of a Pea will make  $4\frac{1}{2}$ : whence it follows, that the grain of a Millet is at least the 91th part of a Pea, according to the received Rules of Mathematicians. This small quantity of Water I gather up into a very slender glass-pipe, dividing by this means that little water into 25 or 30 parts, of which I observe one part after another, and shew the same to others.

Amongst other Spectators, I shew'd it to a not ordinary person, of great sagacity and an excellent sight, who judged with me, that in  $\frac{1}{30}$  part of water, equalling the bigness of a Millet-seed, he saw more than a thousand living Animals: which when he highly wondred at, he wondred much more, when I said, I saw in it two or three kinds of much smaller Animals besides, which did not appear to him, because I saw them by another Microscope, which I still reserve to my self alone. Hence it is manifest, that, if in the  $\frac{1}{30}$  part of one Millet-seed there are seen 1000, there may be seen 30000 in one such whole seed, and consequently in a drop of water, which is 91 times bigger than

than such a seed, there may be seen 2730000.

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Otherwise I compare the quantity of the Water to the bigness of a grain of Sand; in which quantity of water I doubt not at all but that I see more than a 1000 little Animals. Now, if the *axis* of a grain of Sand be 1, the axis of a drop of water is at least 10, and consequently a drop is a 1000 times bigger than that sand, and therefore 1000000 living Creatures in one drop of water. In which computation I rather lessen than heighten the number. 'Tis true, my *calculus* is not, nor can be, so exact, as precisely to determine the number: But I proceed, as those do, who intending to number a flock of Sheep running confusedly one among another, make an estimate by the breadth of the front, and the length of the sides of a flock, how great the number of the Sheep may be. And as he, that seeth a thousand Sheep running together, may in his conjecture erre from the truth a matter of an hundred, more or less; the same may easily be granted to me; yet I need not yield, that I ever do exaggerate my numbers; because that the smallest little Animals, which daily occur to me in water, are more than 25 times less than a globul of blood, because if the axis of such a little Animal is one, that of a globul of blood is at least three; now 3

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These, Sir, I thought good to add to the Observations, I have made, and shew'd to others, with the applause of the beholders. The rest, and the make of the Microscopes, employed by me, I cannot yet communicate. After I had sent away my former Letter, I gave not over observing the *animalcula* in water; examining also distilled and boiled Waters.

Last

Last Winter, when the severe cold had killed the little Creatures, observing the water thawed by the warmth of the room, in which it had stood for a whole day with a fire in it, I found, after 24 hours were elapsed, and another time, after 17 hours were passed, that some living Animals appeared again in that water. When I shall write next, I intend, for further satisfaction, to assert and confirm the truth of what I have related by the testimony of divers Eye-witnesses. I remain, Sir,

Delft, March 23. 1677.

Yours, &c.

*The Continuation of the Hortulan and Rural Advertisements, promised in the next foregoing Tract; communicated by the same hand, Dr. John Beale.*

**T**he Tract of March, having, as to these Hortulan Observations, ended with the fifth paragraph; we now proceed to the

**Sixth**, which is to give notice, That the Cider-Engins for the more speedy and commodious making of Cider and Perry, (as these Engins are now made by *Henry Allun*) may be seen at the Cabinet in Exeter-street near the Savoy; and in the Palace-yard, Westminster. They may be compared with the Cider-Engin belonging to the Cider-houses at *Queen-Hyth*, as also with those belonging to the Cider-houses beyond the Tower; and with the Engins invented by *Mr. Wolridge* of *Petersfield* in *Hampshire*, and the formerly mentioned in N. 124, 583. An Ingelious Gentleman in this neighbourhood, the Owner of *Clifton*, a mile hence, having a Corn-mill and a Malt-mill, on a stream near his house, hath lately built a Cider-mill on the same stream, where it runs through his Orchard, and 'tis said to grind Fruit perfectly well, and with incredible dispatch. The upper stone is fitly hollow'd. The work done by an ingenious Joyner or Carpenter in a neighbouring Village. And I hear, that others are now devising to make Cider-mills, like Malt-mills to be drawn about with a Horse or two, as their occasion shall require. *Mr. Tarrant* in his *Improvement and Dialogue*, p. 106, &c. describeth the Wind-mills and Water-mills, which he had seen amongst Forreigners for the great benefit of the Cloathing-trade. I have long since seen three Mills, a Paper-mill, a Fullers-mill for the benefit of *Bewdley*, and a Mill to grind Scyths and other Utensils of Husbandry, on the stream which feeds the three